

# PATENT SPECIFICATION

DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

### Cooling Apparatus for Beer and Other Beverages

We, J. SAMUEL WHITE & COMPANY LIMITED, a Company registered under the Laws of Great Britain, of Medina Road, West Cowes, Isle of Wight, Hampshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to cooling apparatus for beer, cider and other beverages (hereinafter for convenience called beer) of the kind stored in metal kegs and dispensed from such kegs.

15 Such metal kegs as at present used have a base of recessed form either by being formed wholly concave or by being provided with a downwardly extending rim with the whole of the part of the base which is surrounded by that rim (and is usually then convex) lying above the plane of the lower edge of the rim, while an opening by which they are filled and through which the beer is subsequently withdrawn is provided at the other end and normally closed by a screw plug or the equivalent during transport and storage. Such other end may, and usually will, be otherwise of the same general recessed form as the base. Moreover the recessed end or each recessed end of the keg is usually provided with a series of six to twelve radial strengthening ribs of wedge-shaped cross-section in planes containing the axis of the keg evenly angularly spaced about this axis and each extending from the rim, where it is of the same depth as the rim, towards the centre of the base and terminating at the "thin end" of the "wedge", at a point between (say about half way between) the rim and the centre of the base, such kegs will for convenience herein be referred to as standard metal kegs.

Apparatus for cooling beer stored in standard metal kegs according to the present in-

vention comprises refrigerating apparatus in which the evaporator is in the form of a metallic platform containing the evaporator passage or passages and having an upper surface portion which has a protuberant form and dimensions corresponding to the recessed form and dimensions of the base of a standard metal keg in such manner that the base of a keg placed thereon will make the surface to surface contact therewith over substantially the whole of the area of such base. Where the apparatus is intended for use with standard metal kegs having radial ribs on the base as described above, the upper surface of the platform will also be provided with correspondingly formed radial grooves to receive the ribs in question, for example 12 radial grooves, so as to be suitable for use with kegs having 6 to 12 radial ribs.

In some cases the platform in question may have only a single surface portion having the required form and dimensions corresponding to the form and dimensions of the base of a standard metal keg, while in other cases the metallic platform may be provided with two or more such surface portions so as to be capable of supporting two or more standard metal kegs in the manner referred to. Alternatively the apparatus may comprise two or more separate evaporation platforms each formed in the manner described and together constituting the evaporator system.

In any case there is preferably also included in the apparatus a discharge pipe formed and arranged for insertion through the aperture in the upper end of a standard metal keg resting upon the platform and so that when so inserted it will extend to a point adjacent to the base of the keg and beer withdrawn therethrough will thus flow over the adjacent part of the surface of the base of the keg before entering the discharge pipe. The beer entering the discharge pipe will thus tend to be adequately

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cooled even in circumstances when the layers of beer lying substantially above the base of the keg have not been cooled to the required degree.

- 5 Preferably the remaining parts of the refrigerating apparatus of which the evaporator platform forms a part is formed as a unit with the platform, mounted on a suitable base so that the refrigerating apparatus including  
10 the evaporator platform can be transported and installed as a unit and/or readily moved from place to place if required.

- The parts of the refrigerating apparatus except for the evaporator platform are preferably enclosed within a suitable casing or cover which may also extend around the evaporator platform, for example a casing or cover of plastic material which, as far at least, as the portion covering the parts of the unit other than the platform are concerned, is conveniently a one-piece cover so that these parts of the unit are protected from spillage of liquid.

- The invention may be carried into practice in various ways but two forms of apparatus according to the invention and various modifications thereof will now be described by way of example with reference to the accompanying drawings, in which

- 30 Figure 1 is a general external view of one form of beer cooling apparatus according to the invention having a single cooling pad,

- Figure 2 is a similar view to Figure 1 of an alternative form of beer cooling apparatus according to the invention, also embodying a single cooling pad,

- Figure 3 is a sectional side elevation showing a beer keg in place on the cooling pad of apparatus as shown in Figure 1 or Figure 2,

- 40 Figure 4 is a sectional side elevation of an alternative form of cooling pad which may be used in place of that shown in Figure 3,

- Figure 5 shows a typical refrigeration circuit for cooling apparatus having a single cooling pad as shown in Figure 1 or in Figure 2, and

- 50 Figure 6 shows a modified refrigeration circuit for a modified form of cooling apparatus according to the invention having two cooling pads.

- The apparatus shown in Figure 1 comprises a generally rectangular casing 10 containing all the parts of a refrigeration cooling circuit of conventional type with the exception of the evaporator, the evaporator being incorporated in a cooling pad indicated generally at 11 mounted on the top of the casing 10 and formed in the manner hereinafter more fully described, for engagement by the base of a beer keg of standard pattern.

- In the alternative form of cooling apparatus shown in Figure 2 a cooling pad 11 which, as in Figure 1, incorporates the evaporator of a refrigeration circuit of conventional type, is

70 mounted on a shallow rectangular base 12 around two sides of which extends a casing 13 in which the remaining parts of a refrigeration circuit of conventional type are housed. While the arrangement shown in Figure 1 takes up less plan area than that shown in Figure 2, and is suitable for use with light beer kegs, that shown in Figure 2 is more suitable for heavier beer kegs, the weight of which restricts the height to which they can readily be lifted, but takes up more surface area than that shown in Figure 1.

Referring to Figure 3, which may be regarded as a sectional side elevation of the cooling pad embodied in the construction shown in Figure 1 or that shown in Figure 2 with a standard metal beer keg supported thereon, it will be seen that the standard beer keg 14 has associated with it a combined connecting piece and cap 15 screwed into a hollow screwthreaded boss 16 in the upper wall 17, of the keg, this connecting piece having attached to it a beer discharge tube 18 for the discharge of beer from the keg, so dimensioned that when the connecting piece 15 is in position the lower end of the tube 18 lies adjacent to the centre of the base 19 of the beer keg, and a tube 20 for attachment to a gas cylinder the gas from which can thus pass into the connecting piece 15 and thence through apertures 21 in the interior of the beer keg to force the beer up the discharge pipe 18.

The base 19 of the standard beer keg is as shown of recessed form comprising a centre part of externally convex form surrounded by a rim 22 the lower edge of which lies in a plane wholly below the convex centre part to support the beer keg when resting on a flat surface. In addition the centre part of the base 19 of the beer keg will usually have formed upon its under surface eight radially extending ribs, of wedge shaped cross section in planes containing the vertical axis of the keg, these ribs being evenly angularly spaced about the vertical axis of the keg and extending from the rim 22, where their vertical dimension is approximately equal to that of the rim 22, towards the centre of the base of the keg but terminating at the "thin end" of the "wedge" at points between the rim and the centre of the base.

The pad 11 as shown in Figure 3 comprises a plate-like aluminium casting 23 with in a shallow cylindrical recess 24 in the under surface of which is wound a coil of copper tubing 25 forming the evaporator of the refrigeration system.

The form of winding of the coil 25 is shown in Figures 5 and 6 and the space in the cylindrical cavity 24 between the coil 25 and the aluminium casting 23 is filled with heat-transfer cement.

The casting 23 is provided with a protuberance the upper surface of which is concave to

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conform to the convexity of the outer surface of the centre part of the base 19 of the keg and is provided with eight radially extending grooves 23a to receive the eight wedge-shaped ribs on the base of the keg, if provided, all so that substantially the whole of the under surface of the centre part of the base 19 of the keg will make contact with the corresponding part of the upper surface of the casting 23.

The casting 23 is provided with a flange 26 which bears, through a rubber gasket 27 on the upper surface of a hollow supporting member 28 filled with glass wool or other heat-insulating material, and having an aperture 29 in its upper surface to receive the lower portion of the casting 23 as shown all for the purpose of reducing the transfer of heat from the atmosphere to the under side of the pad 11. Pipes 30 and 31 communicating respectively with the ends of the coil 25 pass through the member 28.

In the modified form of pad shown in Figure 4 the construction is generally similar to that shown in Figure 3, and similar parts have been given similar reference numerals, but the casting 23, instead of being provided with a flange 26, is formed to provide a trough 32 around its central area into which open the outer ends of the grooves 23a in the concave upper surface of the central part of the casting 23 so that this trough receives any water which may drain along such grooves from the centre portion of the casting. In the construction shown in Figure 4 moreover, instead of the hollow supporting member 28 there is provided a body of glass wool or the like 33 retained in place beneath the pad by means of a plate 34 and enclosed in a sheet metal housing 35 having an opening 36 in its upper wall to receive the rim 22 of a keg placed upon the pad. In addition the pad as a whole is conveniently mounted on a plywood panel 37 to reduce conduction of heat to the sides of the metal housing, and a sponge rubber or similar gasket 38 is disposed between the top edge of the trough 32 and the top of the housing 35 to prevent the entry of moisture into the glass wool or like insulation 33. A drain pipe 39 is provided for the flow of water from the trough 32 into a drip tray 40 situated below the plate 34.

In the refrigeration system shown diagrammatically in Figure 5, which may be regarded as embodying a cooling pad as described above with reference to Figure 3 or 4 and as being incorporated in apparatus as described with reference to Figure 1 and Figure 2 the system comprises a compressor 41 arranged to be driven, e.g. by an electric motor and to pump refrigerant vapour through a heat exchanger 42 cooled by a motor-driven fan 43, from which exchanger liquid passes through a restrictor 44 via the pipe 31 into the copper evaporator coil 25 of the cooling pad and then back from the coil through the

pipe 30 to the suction side of the compressor 41, all in conventional manner.

The temperature of the pad 11 incorporating the evaporator coil 25 is controlled by means of an adjustable thermostat 45 the temperature sensing part of which is disposed in a cavity provided in the wall of the casting 23 of the pad as indicated at 46. A mechanically-operated time switch may also be incorporated to short-circuit the thermostat 45 for a predetermined period, say between 30 minutes and 45 minutes, so that, when the time switch is put into operation the refrigerating system will operate at maximum output for the predetermined period to provide the "initial pull-down" required to reduce the temperature at the bottom of a keg placed on the pad comparatively rapidly from normal atmospheric temperature to that desired for consumption.

For example, the apparatus may be arranged to reduce the temperature of beer at the base of the keg from about 70°F. to about 59°F. in the 30-minute time interval, after which the time switch will cut out and put the thermostat 45 into circuit so that the thermostat will thereafter maintain the contents of the keg at a temperature of, say, 10°F. to 15°F. below the ambient temperature thereafter.

Whereas beer cooling apparatus as above described having a single cooling pad will be satisfactory for use where the demand for and consumption of cool beer is comparatively intermittent, where a steadier demand and consumption over a substantial period is anticipated, cooling apparatus having two cooling pads as illustrated in Figure 6 may be preferable. In the refrigeration circuit shown in Figure 6 corresponding parts to those in Figures 1 to 5 are indicated by the same reference numerals. Also included in the circuit of Figure 6 is a liquid receiver 42a between the heat exchanger 42 and the coil 25 while the restrictor 44 is replaced by a thermostatic expansion valve 44a. As will be seen, in this arrangement the evaporator coil 25 of a cooling pad 11 is connected in series with the evaporator coil 25 of a second similar cooling pad 11A, the latter being hereinafter for convenience referred to as the holding pad, the arrangement being such that the refrigerant liquid supplied to the evaporator coil 25 of the cooling pad 11 passes from the outlet pipe 30 of that pad to the inlet pipe 31 of the pad 11A. Situated in the pipe connecting the two coils 25 of the pads 11 and 11A is a phial 47 connected to the thermostatic expansion valve 44a.

In operation the coil 25 of the pad 11 is flooded with liquid until the liquid reaches the phial 47, which then operates to close valve 44a shutting off the supply of refrigerant to the coil 25 of the pad 11 so that the liquid then in the coil 25 of the pad 11 boils off. The phial thus operates to prevent as far as possible liquid from passing into the coil 25 of

the pad 11A. In this way the temperature of the cooling pad 11 is maintained at a lower level than that of the cooling pad 11A, the evaporating coil of which acts as a drier coil and prevents excess liquid from flooding back to the compressor.

The majority of the cooling is thus done in the first pad 11, thereby bringing a keg placed on that pad comparatively rapidly down to an appropriate temperature, at which it can then be maintained by being transferred to the second pad. Thus, a keg for use can be placed of the first pad where it will be rapidly brought down to the required temperature, and the transferred to the second pad, where its temperature will be maintained at the required level during serving of beer from it, and while a further keg placed on the first pad has its temperature brought down to the required value in readiness for similar transfer when the first keg is exhausted, and so on.

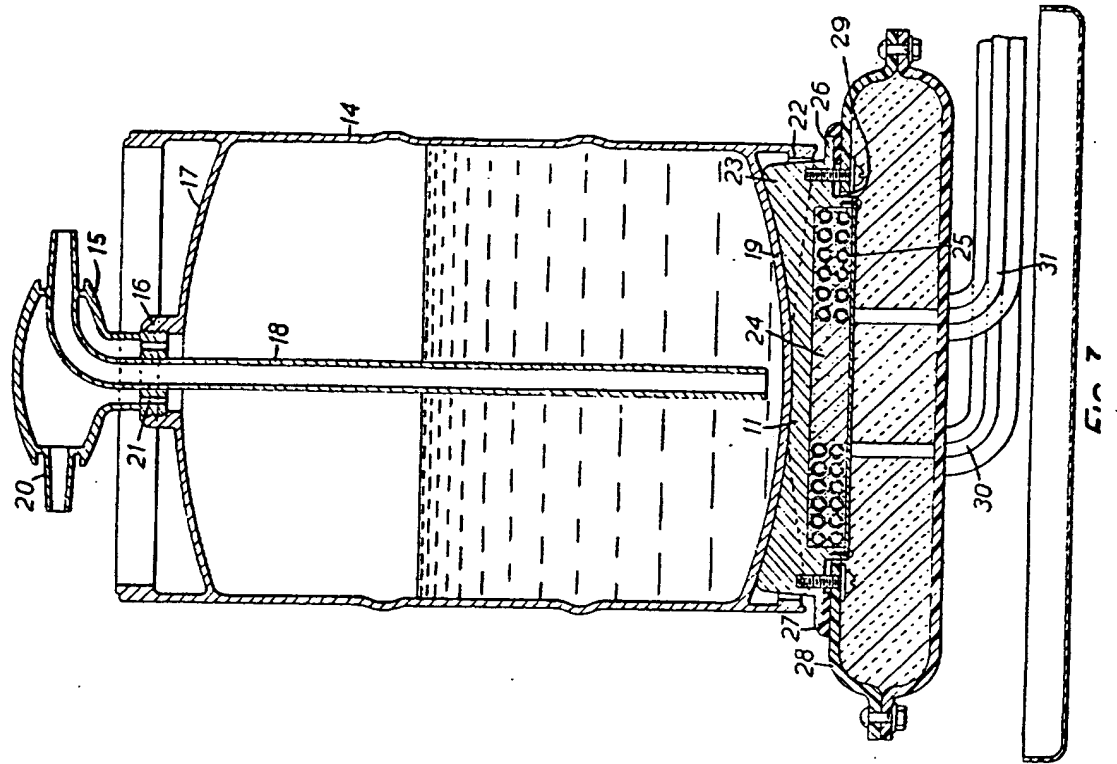
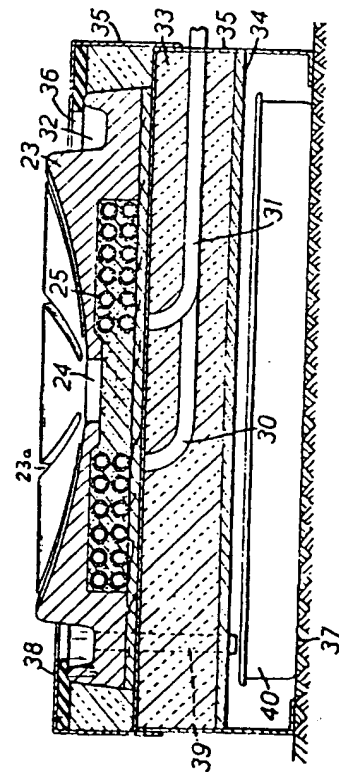
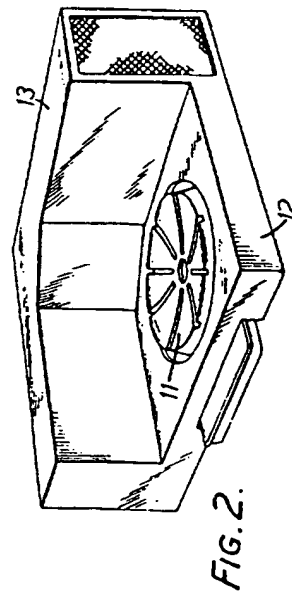
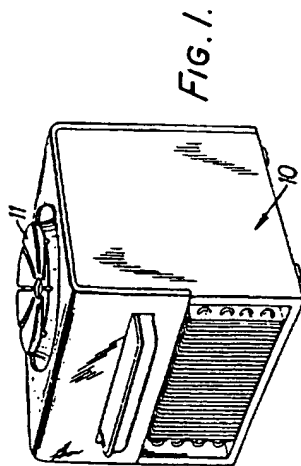
Thermostats 45 and 45A with sensing members 46 and 46A serve to control the temperature of the two kegs, the sensing members being, as shown located between the castings of the two pads. For example, the thermostat 45 controlling the temperature of the first pad may have a temperature range of between about 20°F and 32°F while the thermostat 45A controlling the second pad temperature may have a range of from 30°F to 40°F. A timing switch may be incorporated in the circuit of the first pad in place of the thermostat 45 as described above with reference to Figure 5. In this case the timing switch will usually be connected in series with a neon indicator so that when the timing switch is in operation this will be readily indicated to the operator so as to remind the operator to reset the timing switch when a new "warm" keg is placed on the first pad if the condensing unit is running when this occurs.

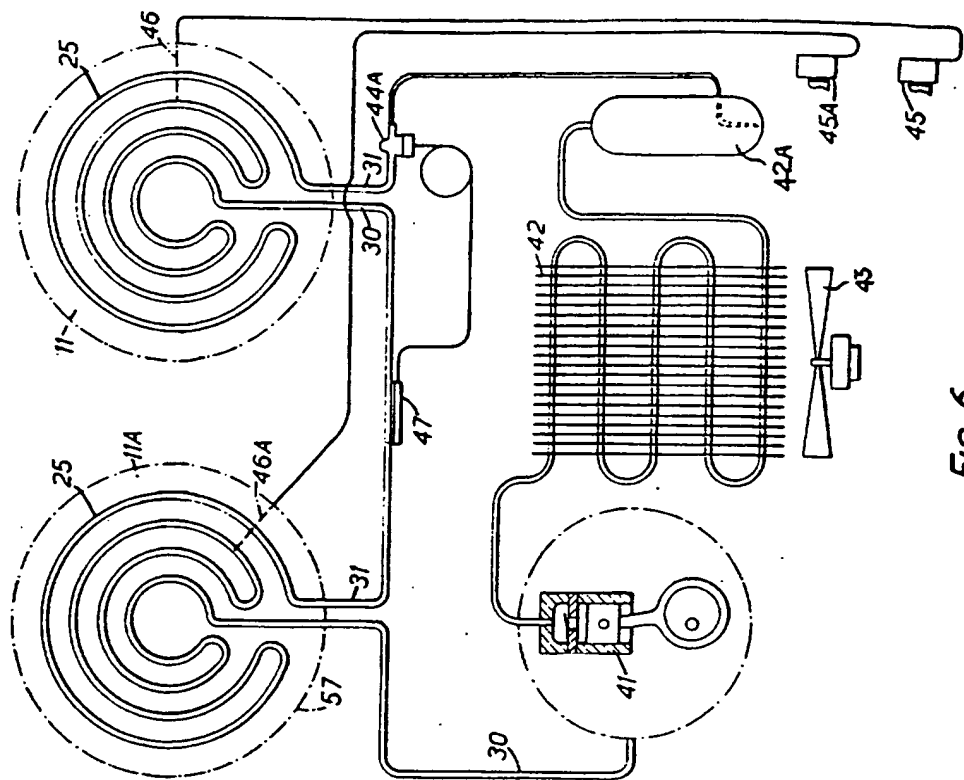
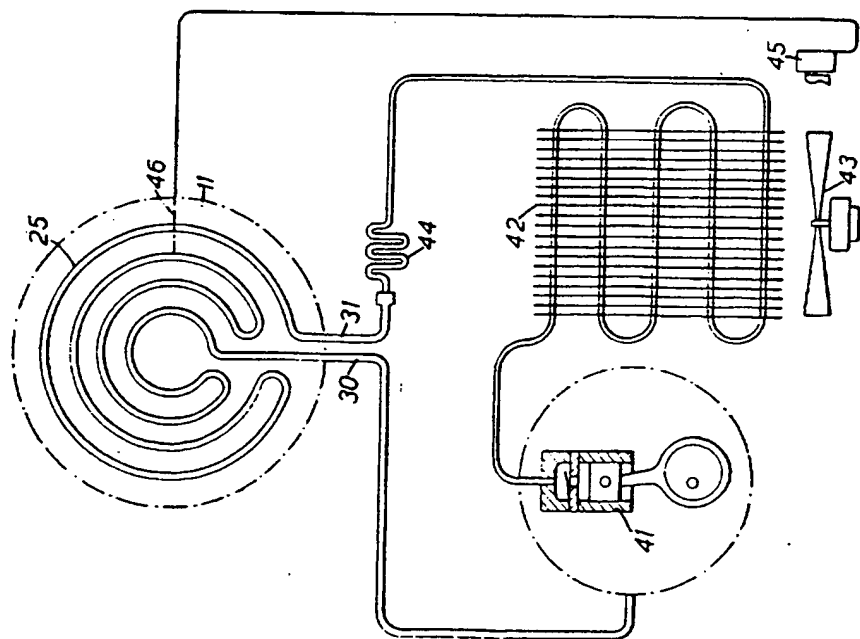
In a modification of the construction described with reference to Figure 1 and in Figure 2 instead of a pad 11 providing a single concave surface for engagement by the base of a single keg, a pad of larger plan area having two or more such surfaces and an evaporator coil of appropriately increased dimensions may be provided.

#### WHAT WE CLAIM IS:—

1. Apparatus for cooling beer stored in standard metal kegs comprising refrigerating apparatus in which the evaporator is in the form of a metallic platform containing the evaporator passage or passages and having an upper surface portion which has a protuberant form and dimensions corresponding to the recessed form and dimensions of the base of a standard metal keg in such manner that the base of a keg placed thereon will make surface to surface contact therewith over substantially the whole of the area of such base. 55
2. Apparatus as claimed in Claim 1 in which the upper surface of the platform is provided with radial grooves to receive radial ribs on the base of the kegs. 60
3. Apparatus as claimed in Claim 1 or Claim 2 comprising a metallic platform having a single surface portion having the required form and dimensions corresponding to the form and dimensions of the base of a standard metal keg. 65
4. Apparatus as claimed in Claim 1 or Claim 2 in which the metallic platform is provided with two or more surface portions each having the required form and dimensions so as to be capable of supporting two or more standard metal kegs. 70
5. Apparatus as claimed in Claim 1 or Claim 2 including two or more separate metallic platforms each having the required form and dimensions. 75
6. Apparatus as claimed in any one of the preceding Claims in which the refrigerating apparatus of which the evaporator platform forms a part constituting a transportable unit so that the refrigerating apparatus including the evaporator platform can be transported and installed as a unit and/or readily moved from place to place if required. 80
7. Apparatus substantially as described with reference to Figure 1 or Figure 2 in conjunction with Figures 3, 4 and 5 and with reference to Figure 6 of the accompanying drawings. 85

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